What processes quench galaxies in dense environments (including groups!)

- What is environment?
- What does it mean to be quenched?
    - How fast is “fast” mode quenching? How slow is slow?

- Preprocessing in groups is important!

Things we want to know:

- How efficient is RPS? How quickly does it act?
- What is the interplay between internal and external quenching mechanisms?
- What are the observational signatures of:
    - Galaxy-galaxy Interactions
    - Strangulation
- Where is the neutral gas in groups? (ASKAP)
    - Conformity?
- At what redshift does environmental quenching begin?

Need more data, more S/N and more simulations!

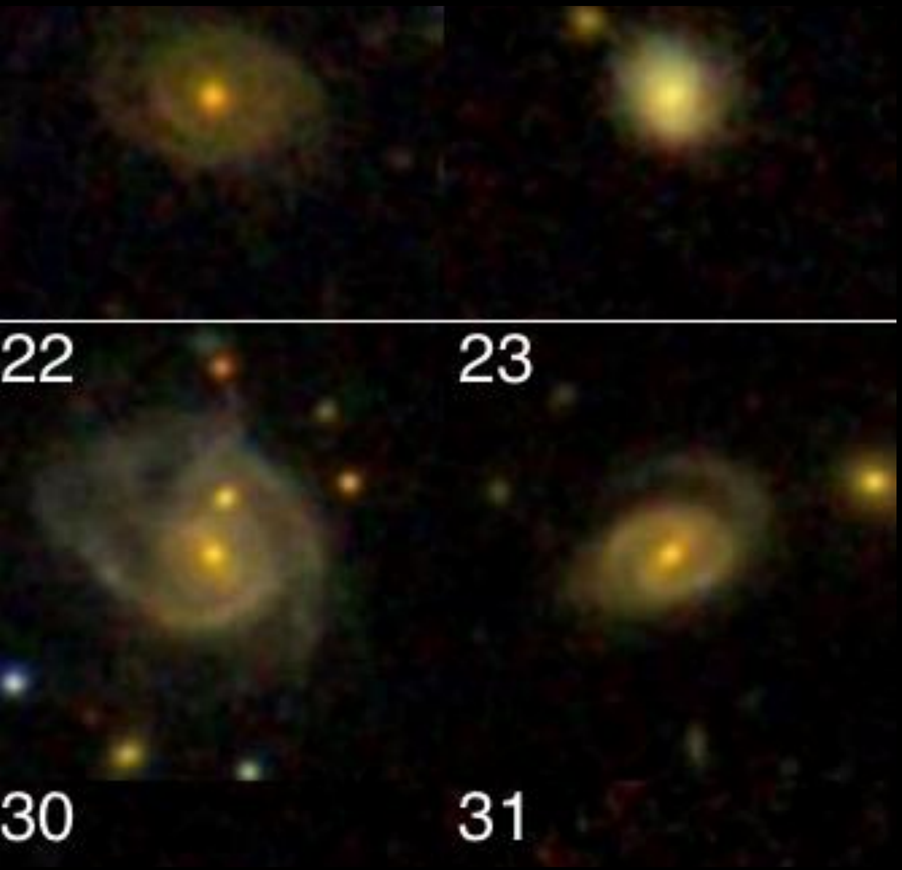
#5. What is next for z=2?

1) Studying gas accretion and outflows at z≈2
2) Understanding dust/metallicity gradients/stellar population properties at z≈2 and beyond
3) Find and study dwarf galaxies at high redshift
4) What role of H_2 in galaxy evolution?
5) Resolving substructures within clumpy star-forming galaxies at z≈2
6) What is mainly driving quenching? Does it vary with redshift?

Do internal structures make any difference?

Is mass quenching / halo host / AGN feedback everything?

Conroy et al. (2015) stellar wind feedback varies with stellar velocity dispersion



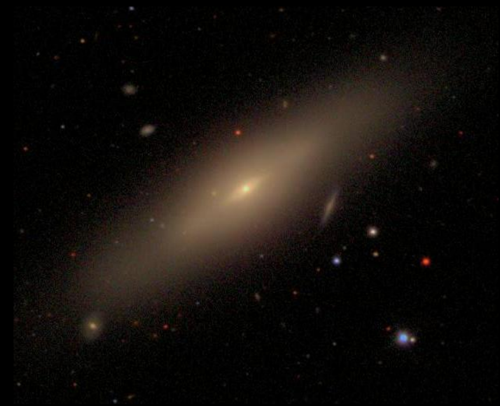
Massive star forming disks
Ogle et al. (2015)

Passive disk galaxies (with ansa bars?)
Fraser-McKelvie et al. (2015)

7 – How do field S0s form?

There are several plausible mechanisms for the formation of S0s in clusters and groups, but how do field S0s form?

- Defining “field” not trivial. Also, some S0s in the field today may have been through clusters/groups and escaped.
- Mechanisms:
  - Starvation (run out of fuel)
  - Flying trough filaments
  - Mergers
  - Disk growth around bulges
  - ...



- Tests:
  - Numbers/LF/mass function
  - B/T ratio distribution
  - Metallicities
  - Peculiar velocities
  - Gas content and properties
  - Ages/metallicities of bulges and disks

#9 Dear Observers: What can simulators do for y'all?

- **How can we entice y'all to come to our table? :(**
- The higher the spatial/temporal resolution, the harder it is (more/better physics is required).
- What matters more, improving our handle of the physics or using observations to constrain parametrization of unknown physics?
- Resolution matters! Not just the level of it, but numerical convergence!
- Improve sub grid physics: gas versus stellar cell/particle is a false binary.
- What if simple models explain empirical phenomena, but models with more physics don't? (I.e., interaction-driven AGN).
- Croom: "It's very science-question dependent".
- Bland-Hawthorn: "We need to figure out how to do simple hydrodynamic tests, but with magnetic fields".
- Simulators: What can observers do for y'all? Large sample numbers? high resolution? Large dynamical range? What's the ideal survey?

Is the relation between bulge formation and quenching causal?

Likely not!

We could not think of any process related to the formation of the bulge that could shut down cooling on halo wide scales. It might stabilise molecular clouds against collapse and bring galaxies to the bottom of the main sequence, but we need most of the cold gas to be gone.

We need to be very careful with correlation and causation. By definition, quenched galaxies are frozen in time and represent the property of the universe at a previous time. If the universe evolves this will naturally lead to dichotomy without causal connection.

How can AGN feedback transform galaxies?

- What would be the observational smoking gun for feedback
  - Positive/negative feedback
  - Outflows, how much actually leaves – CGM?
  - Feedback more important at high z
  - Molecular gas fractions

- Key points:
  1. Timescales (galaxies vs. their BHs)
  2. Different types of AGN (selection biases)
  3. Different forms of feedback (radio mode, quasar mode…)